

## REMARKS

This Amendment is filed to respond to various rejections raised during the prosecution of the application to this point. In response to previous rejections, Applicants have amended independent Claim 25 and dependent Claim 26. Applicants have also added new Claims 36-52. The application now includes independent Claims 25, and 40-43 and dependent Claims 26-28, 31-32, 34-39, and 44-52, with dependent Claims 29, 30, and 33 being previously cancelled. Applicants respectfully submit that the claims of the application include recitations that patentably define over the cited references, taken either individually or in combination. In light of this, Applicants respectfully request reconsideration and allowance of the application.

### **I. Independent Claims 25, 40, 41, and 42 are Patentable**

In previous prosecution, U.S. Patent No. 4,784,972 to Hatada has been cited as disclosing a carrier have layer of either palladium or platinum located thereon. The palladium or platinum layer is used an electrode to deposit conductive leads on the carrier. After formation of the leads, and IC chip is attached to the leads, and the IC chip and leads are then removed from the carrier by pulling the IC and leads away from the carrier. It has been alleged that the structure disclosed in the '972 Hatada patent anticipates the carrier and release layer recited in independent Claim 25 of the present application.

Applicants respectfully disagree. It is true that the '972 Hatada patent does disclose a palladium or platinum layer on the carrier on which the lead is formed. It is also true that the '972 Hatada patent alleges that the leads can be easily removed from the palladium or platinum layer. Applicants submit, however, that although use of palladium or platinum may provide a release layer, the release layer may not have a controlled adhesion property with regard to the leads and may not provide a reliable way to remove the leads from the carrier.

Independent Claims 25, 40, 41, and 42 recite four different carrier structures that provide reliable structures for removal of leads from the carrier. Specifically, amended independent Claim 25 recites that the release layer is etchable. By using an etchable release layer, the leads can be removed by etching away either all or some of the release layer. This provides a reliable method that reduces possible damage to the leads.

Newly added independent Claim 40 recites that the release layer is oxidized metal. By oxidizing the metal release layer prior to formation of the microbeams, the possible adhesion between the release layer and the microbeam is reduced. This, in turn, allows the microbeams to be removed from the carrier more easily with reduced possible damage to the leads.

Newly added independent Claim 41 recites that the release layer is an oxide, and newly added independent Claim 42 recites that the release layer is glass. Similar to the oxidized metal recited in newly added independent Claim 40, the oxide material or glass has reduced adhesion qualities with regard to the microbeams, thereby making it easier to release the microbeams from the carrier.

Applicants respectfully submit that independent Claims 25, 40, 41, and 42 are patentable over the '972 Hatada patent. The '972 Hatada patent merely states that either palladium or platinum are located between the carrier and the leads. It nowhere teaches or discloses that the palladium or platinum is oxidized to reduce the adhesion between the release layer and the leads. As oxidation of platinum and palladium is not a straightforward process, it should have been mentioned in the reference if that was what was intended by the inventors of the '972 Hatada patent. As it was not taught or suggested, independent Claim 40 is patentable over the '972 Hatada patent.

The '972 Hatada patent also does not teach or suggest that other types of release layers may be used. It nowhere discloses that the release layer could be etchable as is recited in independent Claim 25, or an oxide or glass as is respectfully recited in independent Claims 41 and 42. As such, independent Claims 25, 40, 41, and 42, as well as the claims that depend therefrom, are patentable over the '972 Hatada patent.

## **II. Independent Claim 43 is Patentable**

Newly added independent Claim 43 recites a microbeam assembly that allows for testing of an IC chip prior to removal from the carrier. Importantly, the microbeam assembly includes a plurality of fan-out conductors located on the carrier. The assembly also includes a release layer on the carrier. The microbeams are deposited or plated onto the release layer and are in electrical

communication with the fan-out conductors. In this configuration, testing can be performed on an IC chip connected to the microbeams via the fan-out conductors. Further, after testing, the microbeams and IC chip can be removed from the carrier via the release layer, while the fan-out conductors remain on the carrier. (This is more fully described at pages 10-11 of the patent application.)

The '972 Hatada patent nowhere discloses use of fan-out connectors on the substrate for making connection with the microbeams for use in electrical testing, as is recited in newly added independent Claim 43. Specifically, although the '972 Hatada patent disclosing testing of the IC chip while the IC chip and leads are connected to the carrier, it nowhere discloses use of separate fan-out connectors on the carrier for the testing. Instead, it discloses using elongated leads to which test probes are connected. (See Figure 4 and Col. 4, lines 50-58 of the '972 Hatada patent). In the '972 Hatada patent, the elongated leads must be subsequently cut before the IC chip can be placed on a circuit board.

In the claimed invention, however, the use of the fan-out connectors allows microbeams to be made at desired smaller sizes for mounting on a circuit board. The microbeams of the claimed invention overlie the release layer and fan-out connectors are adjacent to the microbeams. After testing, the IC chip and microbeams are removed from the carrier via the release layer and the fan-out conductors remain on the carrier. As the '972 Hatada patent fails to disclose this aspect of the claimed invention, newly added independent Claim 43, as well as the claims that depend therefrom, are patentable.

### CONCLUSION

In view of the amended claim, added claims, and the remarks presented above, it is respectfully submitted that all of the present claims of the application are in condition for immediate allowance. It is therefore respectfully requested that a Notice of Allowance be issued. The Examiner is encouraged to contact Applicants' undersigned attorney to resolve any remaining issues in order to expedite examination of the present application.

It is not believed that extensions of time or fees for net addition of claims are required, beyond those that may otherwise be provided for in documents accompanying this paper.

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However, in the event that additional extensions of time are necessary to allow consideration of this paper, such extensions are hereby petitioned under 37 CFR § 1.136(a), and any fee required therefore (including fees for net addition of claims) is hereby authorized to be charged to Deposit Account No. 16-0605.

Respectfully submitted,



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Date of Deposit March 18, 2003

I hereby certify that this paper or fee is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to Box RCE, Commissioner For Patents, Washington, DC 20231.



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Elaine Kelly

CLT01/4582610v1

**Version with Markings to Show Changes Made:**

In The Claims:

Please cancel Claim 30 and please amend Claims 25 and 26 as follows:

25. (Twice Amended) A microbeam assembly adapted to form interconnects between integrated circuit bond pads and substrate contacts, the microbeam assembly comprising:

a carrier;

a release layer located on said carrier, said release layer being etchable; and

a plurality of conductive microbeams releasably bonded to said release layer [the carrier], wherein the conductive microbeams are sized and spaced to mate with the bond pads of an integrated circuit, and wherein said microbeams are releasable from said carrier by at least partially etching away said release layer. [, and wherein at least one of said conductive microbeams comprises solder coating a portion thereof;

a solder dam positioned on a surface of said at least one conductive microbeam comprising solder opposite said carrier, said solder dam for preventing solder from wetting along a portion of said microbeam not coated with solder; and

a release layer positioned between said carrier and said conductive microbeams for releasably supporting the conductive microbeams.]

26. (Twice Amended) A microbeam assembly according to Claim 25 wherein the carrier is a tape automated bonding (TAB) carrier and said [comprising a] release layer is formed from a material selected from the group consisting of polyimide and parylene.